MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

PEM0044 – ESSENTIAL MATHEMATICS

(All sections / Groups)

30 MAY 2019
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **FOUR (4)** printed pages with 4 questions only, excluding the cover page.

2. Answer all **FOUR (4)** questions.

3. Write all your answers in the answer booklet provided. All necessary workings **MUST** be shown.

4. The formula sheet is attached at the end of this question paper.

Question 1 (25 Marks)

(a) Perform the indicated operations and simplify the answers.

(i) $\left(x^3+2x^2-5x+7\right)-\left(4x^3-5x^2+3\right)$

[2 marks]

(ii) $4+\frac{2}{u}-\frac{3u}{u+5}$

[4 marks]

(b) Solve the following equation.

$$\frac{3+5x}{5}=\frac{4-x}{7}$$

[4 marks]

(c) Use the quadratic formula to solve the following equation.

$$6x^2-x-2=0$$

[6 marks]

(d) Solve the inequality. Express the solutions in terms of intervals whenever possible.

$$9+\frac{1}{3}x\geq 4-\frac{1}{2}x$$

[3 marks]

(e) Find an equation of the straight line that passes through points (1, 6) and (3, 4).

[6 marks]

Continued...

Question 2 (25 Marks)

(a) Let $A=\begin{bmatrix}2 & 4\\ 0 & 6\\ -1 & 3\end{bmatrix}$, $B=\begin{bmatrix}0 & -1\\ 3 & 0\\ 4 & 2\end{bmatrix}$, and $C=\begin{bmatrix}1 & 2\\ 1 & 3\\ 0 & 1\end{bmatrix}$

(i) Show that $A+B=B+A$.

[4 marks]

(ii) Find BC^T.

[3 marks]

(b) Consider the following system of equations.

$$x-y+3z=1$$
$$2x+y+2z=4$$
$$2x+2y+z=5$$

(i) Write the system of equation above in a form $Ax=B$.

[3 marks]

(ii) Find A^{-1}.

[12 marks]

(iii) Find the value of x, y and z.

[3 marks]

Question 3 (20 Marks)

(a) The nth term of a sequence is given as $a_n=3n^2-2$. Write down the first four terms of the sequence.

[8 marks]

(b) Given that the third term of an arithmetic sequence is 36 and the seventh term is 84.

(i) Find the first term and the common difference.

[5 marks]

(ii) Find the sum of the first 10 terms.

[3 marks]

(c) Given the geometric sequence is $7, \frac{7}{3}, \frac{7}{9}, \ldots$, find the 9^{th} term.

[4 marks]

Continued...

Question 4 (30 Marks)

(a) Find the first derivative of the following functions. Simplify your answer.

(i) $w = 5z^4 - 6z^3 + 20z^2 + 6z$

[4 marks]

(ii) $y = (4x+1)(1-x)^2$

[6 marks]

(iii) $y = \dfrac{5x^2 + 2x}{x^2 - 2}$

[6 marks]

(iv) $y = (2x^3 + 4x)^5$

[5 marks]

(b) Evaluate the following indefinite integrals:

(i) $\int (3t^2 + 6t + 1)\, dt$

[3 marks]

(ii) $\int \dfrac{2x}{\sqrt[3]{x^2+1}}\, dx$

[6 marks]

End of Page.

Summary of Formulas

1. Basic Rules of Differentiation

i) $f'(x)=0$

ii) $f'(x)=nx^{n-1}$

iii) $cf(x)=cf'(x)$

iv) $f(x)\pm g(x)=f'(x)\pm g'(x)$

v) $f'(x)=u\dfrac{dv}{dx}+v\dfrac{du}{dx}$

vi) $f'(x)=\dfrac{v\dfrac{du}{dx}-u\dfrac{dv}{dx}}{[v]^2}$

vii) Chain rule: $\dfrac{dy}{dx}=\dfrac{dy}{du}\times\dfrac{du}{dx}$

viii) General power rule: Derive $[f(x)]^n=n[f(x)]^{n-1}f'(x)$

2. Basic Rules of Integration

i) $\int k\ du=ku+C$

ii) $\int u^n du=\dfrac{u^{n+1}}{n+1}+C$

iii) $\int kf(u)\ du=k\int f(u)\ du$

iv) $\int[f(u)\pm g(u)]\ du=\int f(u)du+\int g(u)du$